

REMARKS/ARGUMENTS

Reconsideration and allowance are respectfully requested.

Remarks Regarding Claim Amendments

Support for the amendment to claim 1 may be found throughout the Specification such as, for example, in claim 2. Claim 2 is canceled. No new matter is added and the entry of the amendments is requested.

Remarks Regarding Section 103

A claimed invention is unpatentable if the differences between it and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. *In re Kahn*, 78 USPQ2d 1329, 1334 (Fed. Cir. 2006) citing *Graham v. John Deere*, 148 USPQ 459 (1966). The *Graham* analysis needs to be made explicitly. *KSR v. Teleflex*, 82 USPQ2d 1385, 1396 (2007). It requires findings of fact and a rational basis for combining the prior art disclosures to produce the claimed invention. See *id.* ("Often, it will be necessary for a court to look to interrelated teachings of multiple patents . . . and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue"). The use of hindsight reasoning is impermissible. See *id.* at 1397 ("A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning"). Thus, a *prima facie* case under Section 103(a) requires "some rationale, articulation, or reasoned basis to explain why the conclusion of obviousness is correct." *Kahn* at 1335; see *KSR* at 1396.

Claims 1-10 and 13-20 stand rejected under 35 U.S.C. 103 as allegedly obvious in view of a combination of Takahashi (U.S. Patent 6,444,841), Vogel (U.S. Patent 3,654,192), Krill (U.S. Patent 6,239,294) and Schneider (Applied Catalysis A: General 220 (2201), pp. 51-58). Applicants traverse.

It is the Office Action's position that Takahashi teaches the claimed process except that Takahashi does not teach the use of indium trichloride. Further, the Office Action takes the position that indium trichloride is a well known Lewis acid and that it would be obvious to use indium trichloride because Takahashi teaches the use of Lewis acids as an acid catalyst. Vogel was used by the Examiner to indicate that indium trichloride is a Lewis acid. Since Applicants have deleted indium trichloride from the claim, Vogel is moot regardless of whether indium trichloride is a Lewis acid.

The rejection based on the cited references' alleged use of indium trichloride is moot. Solely in an effort to expedite prosecution, Applicants have narrowed the scope of the independent claim. The claimed invention as amended is directed to a process for the manufacture 2,3,5-trimethylhydroquinone dialkanoate comprising reacting ketoisophorone with an acylating agent in the presence of indium triflate (Indium trifluoromethanesulfonate) as a catalyst. See, e.g., amended claim 1. Claims 2-10 and 13-20 depend on claim 1, incorporate the limitations of claim 1 and is thus directed to embodiments of the same subject. Since the claims no longer relate to the use of indium trichloride, the rejection based on a process involving indium trichloride is moot.

In addition, the Office Action's assertion that Takahashi teaches the claimed process using Lewis acid as an acid catalyst is also not applicable to the current rejection. Applicants disagree that this alleged teaching of Takahashi renders the claimed invention obvious at least because there is no teaching in any combination of references for the use of indium triflate (Indium trifluoromethanesulfonate) in the claimed process. In fact, while Takahashi cites a lot of Lewis acids, indium(III) salts are, however, not mentioned. This indicates that Takahashi (one of the experts in the field) did not expect(III) salts to react as catalyst in this reaction. This is not surprising since catalytic activity is a complex field and it is a property that can be foreseen or predicted. Since a claim limitation is not disclosed in any combination of the cited references, the claimed invention (claim 1 and claims dependent thereon) cannot be obvious in view of the cited references.

In addition, Applicants have found unexpected results in the use of indium triflate (Indium trifluoromethanesulfonate) in the claimed process. To show this unexpected results, Applicants have made a list of the examples of Takahashi, where Lewis acids were used (see, Takahashi, column 3, line 49-50). The claimed process is not comparable to Schneider since the the catalysts of Schneider are not Lewis acids. The amount of catalyst shown below is the molar ratio of catalyst per 1 mol of KIP (Takahashi).

Example	Acetylating agent	Catalyst (amount)	Reaction temperature	Reaction time	conversion	Yield TMHQ-DA	Yield TMC-DA
7 - US 6,444,841 (column 10, line 54-60)	Acetic anhydride	$\text{BF}_3 \cdot \text{OEt}_2$ (0.6 mol%)	90°C	12 hours	99.5%	88.8%	6.8%
8 - US 6,444,841 (column 11, line 11-17)	Acetic anhydride	AlCl_3 (1.5 mol%)	100°C	15 hours	94.0	83.0%	8.2%

The Lewis acid processes of Takahashi can be compared to that of the claimed invention involving indium triflate as shown in the Examples of Applicants' Specification and which is summarized below:

Example	Acetylating agent	Catalyst (amount)	Reaction temperature	Reaction time	conversion	Yield TMHQ-DA	Yield TMC-DA
Applicants' Specification	Acetic anhydride	$\text{In}(\text{SO}_3\text{CF}_3)_3$ (1 mol%)	50°C	5 hours	100%	93.5%	6.8%

See, the Table in the published Specification (there is only one table which appears immediately before the claims). As can be clearly seen, the use of indium triflate

(Indium trifluoromethanesulfonate) results in a better and complete (100%) conversion and yield of desired product in much less time (5 hours vs. 12 or 15 hours in Takahashi) and at a lower temperature (50°C vs. 90°C and 100°C in Takahashi). This surprising and unexpected result is a significant improvement over Takahashi and it could not be possible using any of the Lewis Acids disclosed or rendered obvious by Takahashi except by hindsight reasoning after reviewing Applicants' Specification.

One of ordinary skill in the art, using the Lewis Acids of Takahashi, would not have achieved the benefits of the claimed invention. Furthermore, there is a large number of different Lewis acids known and it would take undue experiments to screen each and every known Lewis acid to derive the claimed indium triflate (Indium trifluoromethanesulfonate) of Applicants' claimed process.

The other references cited by the Examiner are not relevant to the rejection of claim 1. Takahashi and Vogel are discussed above. According to the Office Action, Krill teaches "the production of mixture of α -tocopherol/ α -tocopherol acetate by condensation of trimethylhydroquinone diacetate and isophytol" and Schneider teaches "production of (all-rac)- α -tocopherol (acetate) directly from 2,3,5-trimethylhydroquinone diacetate with isophytol (IP) or saponification/transesterification to 2,3,6-trimethylhydroquinone monoacetate/2,3,5-trimethylhydroquinone followed by the reaction with IP." With respect to Krill, this reference only shows a combination of ZnX_2 -HY can be used as catalyst (see abstract and column 6, line 66 – column 7, line 1), especially $ZnBr_2$ -HBr (see examples). Significantly, Krill does not teach that ZnX_2 may be used alone. Furthermore, Krill describes the condensation of trimethylhydroquinone diesters with isophytol to obtain α -tocopherol (see abstract; column 2, 2nd paragraph (line 4-18); column 3, line 57 – column 4, line 7; column 4, line 12-40; and examples, as well as claim 1). The reaction of ketoisophorone ("KIP") to trimethylhydroquinone diesters ("TMHQ DE") is only mentioned, but no details are given (see column 3, line 31-53 and column 4, line 8-11). Unlike the claimed invention, it is not stated in Krill that ZnX_2 -HY can be used as catalyst for the reaction of ketoisophorone to

trimethylhydroquinone diesters. Thus, there is the teaching in Krill that catalysts used for the condensation of trimethylhydroquinone diesters with isophytol are different from those used for the reaction of ketoisophorone to trimethylhydroquinone diesters. For at least these reasons, a combination of the cited references (which would include Krill) does not teach or render obvious the claimed invention. Further, Applicants note that Krill and Schneider relate to claims 8-10 only and do not relate to claim 1.

For at least the above stated reasons, the claim 1 is not obvious in view of a combination of the cited references. Moreover, claims depending from independent claim 1, including claims 2-10 and 13-20 are also not rendered obvious by the cited documents because all limitations of the independent claim are incorporated in its dependent claims. M.P.E.P. § 2143.03 citing *In re Fine*, 5 USPQ2d 1596 (Fed. Cir. 1988).

Withdrawal of the Section 103 rejections is requested because the claims would not have been obvious to one of ordinary skill in the art when this invention was made.

Conclusion

Having fully responded to the pending Office Action, Applicants submit that the claims are in condition for allowance and earnestly solicit an early Notice to that effect. The Examiner is invited to contact the undersigned if additional information is required.

Respectfully submitted,

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